

likewise tying up transportation and causing immense damage to wire systems.

Heavy snow, sleet, and glaze occurred in portions of Wisconsin and Michigan from the storm of March 31-April 1, causing much damage to overhead wires, shade, fruit, and other trees.

At a few points, notably in Nevada, the snow was the heaviest of record for April, while at Red Bluff, Calif., snow on the 5th was the first ever observed in April.

RELATIVE HUMIDITY

As a rule, the percentages of relative humidity were above the average at most points to east of the Rocky

55/1.5/5 (68) (73)

SEVERE LOCAL STORMS, APRIL, 1929

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau]

Place	Date	Time	Width of path, yards ¹	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Kentucky (western)	1				\$25,000	Wind	Buildings destroyed or damaged; wire lines injured.	Official, U. S. Weather Bureau.
Louisville, Ky.	1	A. M.			10,000	do	2 oil barges sunk; windows and buildings damaged.	Do.
Hardin County, Ohio.	1	do				Wind and hail	Considerable losses; greenhouses suffered severely.	Do.
New York (mainly western, central, and northern).	1			1	400,000	Wind	Hangar and small buildings wrecked; houses unroofed; trees and wire lines blown down; docks and boathouses damaged.	Official, U. S. Weather Bureau. Courier Express (Buffalo, N. Y.).
Portland, Pa., to Blairs-town, N. J.	1	4-5 p. m.	100	3	50,000	Tornado	30 buildings destroyed; several persons hurt. Path 8 miles long.	Official, U. S. Weather Bureau.
Ottawa to Rogers Counties, Okla.	3	12:15-12:45 p. m.	1,760		4,200	Severe hail	Greatest damage at Vinita. Path 35 miles long.	Do.
Lyon County, Iowa.	5	3 p. m.		1	21,000	Tornado	Some hail with tornado.	Do.
Hennepin County, Minn., to Polk County, Wis.	5	5:30 p. m.	200-440	6	1,000,000	do	Traversed part of Minneapolis. Path 70 miles long.	Do.
Pierce to Iron Counties, Wis.	5	5:45-8:30 p. m.	30-400	12	725,000	Tornado and hail	Losses chiefly farm buildings, livestock, wire lines. Path 170 miles long.	Do. Journal (River Falls, Wis.); News (Ladysmith, Wis.).
Hancock County, Iowa.	5	6:30 p. m.			10,000	Tornado	4 persons hurt.	Official, U. S. Weather Bureau.
Cloud and Washington Counties, Kans.	6	2:30-3:30 p. m.	200-880		40,000	do	Farm buildings and wire lines damaged. Path 45 miles long.	Do.
Cloud to Marshall Counties, Kans.	6	2:30-4:10 p. m.	1-5 mi.		60,000	Wind and hail	Embraced the tornado-swept area noted above.	Do.
Mitchell County, Kans.	6	3 p. m.	880		2,000	Heavy hail	Roofs and glass damaged. Path short.	Do.
Iowa (east-central).	6	4-7 p. m.			5,800	Hail and wind	3 countries affected.	Do.
Grant, Lafayette, and Green Counties, Wis.	6	4:30-6:20 p. m.	30-440		250,000	Tornado and hail	Losses chiefly in buildings, wire lines, livestock, and timber. Many injured. Path 50 miles long.	Do.
Union County, Iowa.	6	7 p. m.			4,000	Tornado	No details reported.	Do.
Warren County, Iowa.	6	7:30 p. m.	30		3,400	do	8 persons hurt. Path 4 miles long.	Do.
Jasper and Marshall Counties, Iowa.	6	do			25,000	do	1 person injured. Path 25 miles long.	Do.
Perry, Okla., and vicinity.	7	1-1:30 p. m.	3 mi.		22,000	Heavy hail	Damage chiefly to crops. Path 10 miles long.	Do.
Chicago, Ill.	7	7:45 p. m.			3,000	Small tornado	Path in south part; short and very narrow.	Official, U. S. Weather Bureau.
McDonald County, Mo.	7	9 p. m.			600	Probably tornado	Some buildings damaged; no person harmed. Path narrow and 3 miles long.	Do.
Scurry, Tex.	8	2 a. m.	800		3,500	Tornado	Buildings damaged.	Do.
Ennis, Tex.	8	3 a. m.	300			do	Destroyed small buildings; 1 person injured.	Do.
Clarksville, Tex.	8	5 a. m.	30			do	Small buildings damaged.	Do.
Humble, Tex.	8	11 p. m.			20,000	Wind	Oil derricks blown down.	Chronicle (Houston, Tex.).
Lake Charles, La.	9	2:30 a. m.			25,000	do	Oil equipment damaged.	Official, U. S. Weather Bureau.
Clark County, Kans.	9	4 p. m.				Small tornado	Touched ground but once.	Do.
Kansas (northwest part)	9	4:30-7 p. m.				Heavy hail	Damage small, chiefly to fruit; 3 counties affected.	Do.
Chautauqua County, Kans.	9	8:30 p. m.			1,500	Small tornado	Path 15 miles long.	Do.
Lebanon, Kans.	9	11 p. m.	50		3,000	do	Path but half mile long.	Do.
Neosho County, Kans.	9-10	11 p. m.-2 a. m.			2,500	Heavy hail and small tornado.	Windows broken and automobile tops punctured by hail.	Do.
Calico Rock, Ark. (near)	10	3 p. m.	220			Tornado	Damage slight. Path 1 mile long.	Do.
Troup, Tex.	10	3:18 p. m.	2 mi.		23,500	Hail	Buildings and crops damaged. Path 11 miles long.	Do.
Almond to Moorefield, Ark.	10	4-4:20 p. m.	170		20,000	Tornado	Several injured. Path 14 miles long.	Do.
Almond to Lorado, Ark.	10	4-7:45 p. m.	200-1,200	31	308,000	do	Started near preceding; worst havoc near Swifton. Path 65 miles long.	Do.
Mount Pleasant, Ark.	10	4:30 p. m.				do	Damage slight. Path narrow and short.	Do.
Herpel to Mount Pleasant, Ark.	10	5 p. m.	300-400	7	216,000	do	Guion almost obliterated. Path 18 miles long.	Do.
Alice, Tex.	10	do	15			Small tornado	Destroyed poultry house.	Do.
Diaz, Ark.	10	6:20 p. m.	300		11,000	Tornado	2 persons hurt. Path 2 miles long.	Do.
Monette, Ark.	10	8 p. m.	220		40,000	do	Path 2 miles long.	Do.
Wynne (near) to Parkin, Ark.	10	8-8:30 p. m.	100	18	200,000	do	Princeton suffered most. Path 16 miles long.	Do.
Wynne, Ark.	10					Hail	Considerable damage.	Do.
Coffey County, Kans.	10	8:15 p. m.	3-4 mi.			Heavy hail	Path 5 miles long.	Do.
New Jersey coast.	10-11				150,000	Gale	Surf high; houses swept away; boardwalk partly torn out. Northern Ocean County suffered most.	Do.
Ellis County, Okla.	13	5 p. m.	5 mi.			Heavy hail	Damage considerable.	Do.
Canadian County, Okla.	13	10-11 p. m.				do	Gardens and fruit trees suffered.	Do.
Smithville, Tex.	14	6:10 a. m.	400		75,000	Tornado	Several injured; buildings damaged.	Do.

¹ "Mi" signifies miles instead of yards.

SEVERE LOCAL STORMS, APRIL, 1929—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Eastland and Comanche Counties, Tex.	14	4:30-5 p. m.			65,000	Hail	Livestock killed near De Leon; buildings and crops damaged.	Official, U. S. Weather Bureau.
Rusk, Gregg, and Harrison Counties, Tex.	14	5-8 p. m.	2-6 mi.		5,000	do	Poultry, glass, fruit, and crops suffered.	Do.
Louisiana (southeastern)	14	5:30 p. m.			15,000	Hail and thunder-squall.	Gardens and oranges damaged.	Do.
Goodwell, Okla.	14	7:15 p. m.	1½ mi.		500	Hail	Windows broken; roofs and auto tops damaged. Path 3 miles.	Do.
Louisiana (northwestern)	14	8-9 p. m.		1	6,000	Thundersquall	Buildings, windows, and trees suffered from Shreveport to Arcadia.	Times (Shreveport, La.).
Subiaco, Ark.	14	P. m.				Tornado	Damage slight. Path narrow and short.	Official, U. S. Weather Bureau.
Apalachicola, Fla. (near)	15	3 p. m.				Possibly tornado.	Pine trees broken off; path one-fourth mile long.	Do.
Anthony, Fla.	15	7:30-8 p. m.	1½-2 mi.		3,000	Heavy hail	Tomatoes and other crops suffered.	Do.
New Jersey (mainly southern)	16				300,000	Gale	Buildings along seashore wrecked or damaged; buildings, trees, wire lines, and crops over State harmed.	Do.
Harper County, Okla.	18	4-5 p. m.				Tornado	House demolished; farm machinery wrecked; 2 persons hurt.	Clark County Clipper (Ashland, Kans.).
Llano, Tex. (near)	18	5 p. m.	5 mi.			Hail	Poultry killed.	Post-Dispatch (Houston, Tex.).
Belton, Tex.	18	6:30 p. m.	1 mi.		10,000	do	Crops damaged.	Official, U. S. Weather Bureau.
Dallas, Tex.	19	4:42 a. m.			10,000	Wind	Small buildings, glass, and shrubbery damaged.	Do.
Cowley County, Kans.	19	4 p. m.	880		1,000	do	Barn destroyed; trees blown down. Path a mile long.	Do.
Duke, Okla.	19	4:30-5 p. m.	4 mi.		15,000	Heavy hail	Crops greatly harmed. Path 10 miles long.	Do.
Sumner County, Kans.	19	5 p. m.	1 mi.		10,000	do	Gardens and fruit suffered. Path 3 miles long.	Do.
Cleburne, Tex.	19	6:30 p. m.	600	1	36,000	Tornado and hail	Many houses destroyed; 2 persons injured.	Do.
Kiowa and Caddo Counties, Okla.	19	7:30 p. m.	1 mi.			Hail, wind, and rain.	Path 13 miles long.	Do.
Weatherford, Okla., and vicinity.	19	8:15 p. m.	1 mi.		5,000	Hail	Damage mainly to crops. Path 6 miles long.	Do.
Paris, Tex.	19	8:30 p. m.	100		40,000	Wind	Buildings damaged.	Do.
Waxahachie, Tex. (near)	19		3 mi.			Hail	Livestock killed; crops damaged.	Do.
Inman, S. C.	19	11 p. m.			3,000	Thunderstorm	House fired and burned.	Do.
Wilson County, Kans., to Bates County, Mo.	20	3-5 p. m.	30-440		175,000	Tornado	Some farms swept clean; 6 persons hurt. Path 70 miles.	Do.
Greenwood to Anderson Counties, Kans.	20	3:07-4:30 p. m.	30-170	1	75,000	do	Several funnel clouds at times. Path 70 miles long.	Do.
Buckner, Ark.	20	3:30 p. m.			1,000	do	Path short.	Do.
Barton and Vernon Counties, Mo.	20	4-5 p. m.	30-440		84,000	do	Funnel cloud noted over Kansas, but reached ground only in Missouri; a few persons hurt. Path 15 miles long.	Do.
St. Clair County, Mo.	20	4-5 p. m.			1,500	Probably tornado.	Farm buildings wrecked. Path very narrow, but 2 miles long.	Do.
Anderson County, Kans.	20	4:30 p. m.			5,000	Small tornado.	Damage to barns and a drilling rig. Path 8 miles long.	Do.
Polk and Hickory Counties, Mo.	20	5:30-6 p. m.	300-880		15,000	Tornado	Buildings and furniture destroyed; many hurt. Path 14 miles long.	Do.
Polk and Dallas Counties, Mo.	20	6 p. m.	100-300		171,000	do	Great havoc in Bolivar; many injured, some seriously. Path 24 miles long.	Do.
London, Ark.	20	6:30 p. m.	100		9,000	do	Path short.	Do.
Clinton, Ark.	20	7:25 p. m.	200		11,000	do	do	Do.
Batesville, Ark. (near)	20	8:45 p. m.	75		13,000	do	A few persons injured. Path short.	Do.
Jeffersonville and New Albany, Ind., and Louisville, Ky.	21	2:30-2:45 p. m.			100,000	Hail	Greenhouses, roofs, windows, and auto tops damaged; a few persons hurt. Havoc mainly in Indiana.	Do.
Alexander County, Ill., to Ballard County, Ky.	21	2:30-4:30 p. m.	4 mi.		60,000	Heavy hail	Roofs, hotbeds, and crops damaged. Path 30 miles long.	Do.
Tillar, Ark.	21	2:45 p. m.		12	1,000	Tornado	2 houses wrecked. Path narrow, but 5 miles long.	Do.
Dahomy and Shaw, Miss.	21	3 p. m.		7		Probably tornado.	Many seriously hurt; considerable property loss.	Do.
Oak Ridge, La. (near)	21	3:45 p. m.	18-50	2	7,550	Tornado	Several houses demolished. Path 8 miles long.	Do.
Springbank, Ark.	21	9:10 p. m.			2,000	Heavy hail	Crops, roofs, and windows damaged.	Times-Picayune (New Orleans, La.).
Walton, Ky.	21			2		Thunderstorm	Barn struck by lightning; several survivors shocked.	Official, U. S. Weather Bureau.
Tennessee	21					Thundersqualls and hail.	Houses unroofed; crops riddled; trees and fences blown down.	Do.
Extreme southern Ohio and central West Virginia.	21	P. m.			50,000	Hail and wind	Trees stripped, early crops beaten down, roofs cut, buildings unroofed, small structures and trees blown over. Havoc greatest in Gallia County, Ohio, and Randolph and Pocahontas Counties, W. Va.	Do.
Columbia, S. C.	22	4 a. m.			3,200	Thundersquall and hail.	Plate glass and merchandise damaged.	Do.
Charleston, S. C. (near)	22				20,000	Severe hail.	Crops suffered.	Do.
Frontier and Dawson Counties, Nebr.	23	11 p. m.			50,000	Tornado and downpour.	Farm buildings wrecked. Tornado path 10 miles long. Considerable flood damage.	Do.
Wyoming (southeastern)	23-24				300,000	Heavy snow	Wires prostrated; trees down; cars and automobiles stalled; some stock lost.	Do.
Harper County, Okla.	24	1 a. m.				Tornado	Buildings and windmills destroyed or damaged; chickens killed. Path 14 miles long.	Clark County Clipper (Ashland, Kans.).
Slocum and Denson Spring, Tex.	24	12:20 p. m.	3 mi.	7	200,000	do	Slocum wiped out; scores of persons injured. Path fully 9 miles long.	Official, U. S. Weather Bureau.
Center, Tex. (near)	24	2:30 p. m.	800		125,000	do	Several persons hurt; buildings and crops damaged.	Do.
Butler County, Nebr.	24	3 p. m.			75,000	do	Buildings wrecked; a few people hurt. Path 35 miles long.	Do.
Saunders and Sarpy Counties, Nebr.	24	4:40 p. m.			41,500	do	Buildings wrecked or damaged. Struck in 2 strips in path 20 miles long.	Do.
Bourbon County, Kans.	24	6:30 p. m.	100		5,000	do	Farm buildings demolished or injured; 2 persons hurt. Path 6 miles long.	Do.
Winnboro, La. (near)	24				12,000	Thundersquall	Damage to buildings and timber.	Do.
Anderson and Spartanburg Counties, S. C.	25	3:50-4:30 p. m.	400-900	6	102,000	Tornado	Scores badly injured; buildings wrecked or damaged. Extreme limits of havoc 43 miles apart, but large gaps.	Do.
Sparta, Ga.	25	4 p. m.				Possibly tornado.	Houses demolished; one person hurt.	Do.
Bleckley to Laurens Counties, Ga.	25	4:20-5 p. m.	150-400	11	330,000	Tornado and hail	Buildings wrecked; crops ruined; scores injured. Path 25 miles long.	Do.
York, Pa.	25	8 p. m.	100		10,000	Possibly tornado.	Several houses unroofed; wire lines broken.	Do.
Candler and Bulloch Counties, Ga.	25	8:20 p. m.	100	40	1,020,000	Tornado and hail	Hundreds hurt; buildings demolished; stock killed; crops destroyed. Path 15 miles long.	Do.

SEVERE LOCAL STORMS, APRIL, 1929—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Norristown, Ga.	25		200	2	50,000	Tornado and hail	Houses and crops suffered.	Official, U. S. Weather Bureau.
Georgia (south-central part)	25				100,000	Heavy hail	Fruit and other crops greatly damaged. Houston and Tift Counties hard hit.	Do.
Churubusco, Ind.	25				10,000	Possibly tornado	Garage destroyed; windows, poles, and fruit trees suffered.	Do.
Ohio (northeastern)	25					Heavy hail	Greenhouses, roofing, and auto tops damaged. Northern part of Wayne County hardest hit.	Do.
Akron to Ravenna, Ohio	25			3		Wind and electrical	Roofs ripped off; outbuildings destroyed; trees flattened.	Standard Union (New York, N. Y.).
Moundsville, W. Va., and vicinity	25				15,000	Hail and wind	Factory partly unroofed; glass broken.	Official, U. S. Weather Bureau.
Louisa County, Iowa	27	7 p. m.	220		2,100	Tornado	No personal injuries reported.	Do.
Kershaw County, S. C.	28	2:30 p. m.	100	1	5,000	do.	Injuries to 12 persons.	Do.
Cleveland, Ohio, and vicinity	28	4-5 p. m.		1		Thundersquall and hail	Windows blown in; boy drowned from upset sailboat. Marked wind damage at Parma Village, in tract 200 yards long and 75 yards wide.	Do.
Tom Green and Runnels Counties, Tex.	29	Noon	880		5,000	Hail and wind	Crops and livestock suffered; windmills blown down; houses unroofed.	Do.
Mercury, Tex.	29	3 p. m.	6 mi.		30,000	Hail	Crops, buildings, and autos damaged.	News (Dallas, Tex.).
Richards, Tex.	29	5 p. m.	6 mi.		50,000	Wind	Losses mainly in crops and buildings. 3 persons hurt.	Official, U. S. Weather Bureau.
Bell County, Tex.	29	5-5:30 p. m.	1-3 mi.		1,500	Wind and hail	Crops and buildings suffered.	Do.
Doniphan County, Kans.	30	1 a. m.			1,000	Wind	Outbuildings destroyed; windows broken; wire lines down.	Do.
Mahaska and Keokuk Counties, Iowa	30	6 a. m.			12,000	do.	1 person hurt.	Do.
Linn County, Iowa	30	7:30 a. m.			3,000	do.	No details.	Do.
Ionia County, Mich.	30	4 p. m.				Electrical and tornadoic wind.	Buildings razed; considerable damage from lightning.	Do.
Winnebiek County, Iowa	30	5 p. m.			4,000	Tornado	No details.	Do.
Trempealeau, Wis.	30	5:15 p. m.				Heavy hail	Apple buds and early vegetables suffered.	Do.
Alabama (central and northeastern).	30				10,000	Hail	Garden truck injured; young cotton ruined locally.	Do.

627.41 (73) RIVERS AND FLOODS

By H. C. FRANKENFIELD

The outstanding feature of the month of April was the great Mississippi flood. As shown in previous reports, the Mississippi River at the close of March, 1929, was in flood from Muscatine, Iowa, to Baton Rouge, La., and during the month of April the river continued above the flood stage from the mouth of the Ohio River southward, a primary crest of 18.4 feet passing Orleans, La., on April 29. However, the decline from the primary crest was slight, and after a few days another rise to still greater heights set in, and at the end of May it was still in progress below the mouth of the Arkansas River. Discussion of this lower Mississippi flood will therefore be postponed, as probably it will be about the middle of June when the crest of the flood passes into the Gulf of Mexico.

Mississippi River above the mouth of the Ohio.—The river did not reach the flood stage above Muscatine, Iowa, although it was quite high during late March and in April as far north as the mouth of the Wisconsin River. Comparatively little of the abnormally heavy winter snowfall over Wisconsin, Minnesota, and Iowa had melted by the end of February, but above normal temperatures during the first week of March started snow melting, although not in large quantity during the first week, and soon the main river and all tributary streams began to rise. While rains were neither frequent nor heavy, comparatively high temperatures continued, and by the middle of the third week of March little snow remained, and tributary streams generally were in flood, especially those of the State of Iowa, two of which, the Cedar and Nishnabotna Rivers, rose to the highest stages of record. During the early days of the flood the situation was further complicated by the occurrence of ice gorges, mainly over the southern portion of the State, that caused local overflows which were very destructive to bridges, highways, and farm property. For an excellent résumé of the conditions in the State of Iowa the reader is

referred to the Monthly Climatological Summary of that State for the month of March.

The lower Wisconsin River flood was an April flood, beginning with the 7th at Merrill, and ending with the 13th at Portage, Wis. Warnings were issued at the proper time and there was no damage of consequence. Similar conditions prevailed during the first week of April in the lower Rock River of Illinois.

The upper Mississippi River was in flood from Muscatine, Iowa, to the mouth of the Ohio River, especially above St. Louis, Mo., the region of maximum intensity extending from the mouth of the Des Moines to the mouth of the Missouri River. At Muscatine the river was above the flood stage from March 19 to April 7, and again from April 13 to 25; at Keokuk, Iowa, continuously for 49 days from March 16 to May 3; at Warsaw, Ill., for 48 days from March 16 to May 2; at Quincy, Ill., for 55 days from March 14 to May 8; and at Hannibal and Louisiana, Mo., for 58 days from March 14 to May 11. From Keokuk to Louisiana the crest stages were but little below the highest recorded stages, and the flood was the greatest since June, 1903.

Reported loss and damage amounted to \$1,185,500, divided as follows: Tangible property, \$109,000; matured crops, \$25,000; prospective crops (38,000 acres), \$784,000; livestock, etc., \$1,000; suspension of business, \$266,000. Reported money value of property saved through flood warnings, \$125,000.

On March 21 a crevasse occurred in the Indian Grave Levee, just north of Quincy, Ill., and 17,000 acres of land, much of it under cultivation, were overflowed. At about the same time a breach occurred in a small protecting levee at Canton, Mo., and a considerable portion of the lower section of the town was flooded. On April 21 the Marion County, Mo., levee along Fabius River broke, and 4,000 acres of land were overflowed. This levee also broke in November, 1928. On April 21 there was a further breach at Canton, Mo., and again the lower section of the town was inundated. The final crevasse was